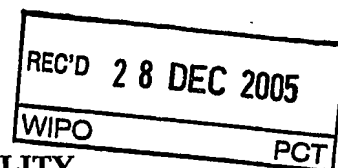


PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/NO2004/000255	International filing date (day/month/year) 30.08.2004	Priority date (day/month/year) 01.09.2003
International Patent Classification (IPC) or national classification and IPC See Supplemental Box		
Applicant Fossura AS et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input checked="" type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input checked="" type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand 18.03.2005	Date of completion of this report 13.12.2005
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Carl Fröderberg/EK Telephone No. +46 8 782 25 00

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NO2004/000255

Box No. I Basis of the report

1. With regard to the language, this report is based on:

- ☐ the international application in the language in which it was filed
- ☐ a translation of the international application into _____,
which is the language of a translation furnished for the purposes of:
- ☐ international search (Rules 12.3(a) and 23.1(b))
- ☐ publication of the international application (Rule 12.4(a))
- ☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

- ☐ the international application as originally filed/furnished
- ☒ the description:
pages 1 - 10 _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____
- ☒ the claims:
pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 1 - 3 received by this Authority on 26-07-2005
pages* _____ received by this Authority on _____
- ☒ the drawings:
pages _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NO2004/000255

Box No. II Priority

1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
☐ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
☐ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
2. ☐ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

The priority is considered valid. Therefore, document
US2004/0010947 A1 is of no relevance for this report.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NO2004/000255

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-23</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-23</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-23</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:

D1: US 4631844
D2: US 4418484
D3: US 2952083
D4: US 6449883
D5: US 5970635
D6: GB 1262660

The invention relates to a subsea excavation and suction device for complete submersion comprising a suction head that comprises both hydraulic and mechanic means to disintegrate solid material. The invention has been restricted by the amended first claim filed with the letter of 2005-07-26. Particularly by adding to claim 1 that the subsea excavation and suction device shall be completely submerged. This makes it unobvious to a person skilled in the art to modify the underwater dredging system in D1 in such a way that the claimed invention according to the amended first claim is obtained.

The cited documents represent the general state of the art and the invention defined in amended claims 1- 23 is not disclosed by any of these documents.

Accordingly, the invention defined in the amended claims 1- 23 is novel and is considered to involve an inventive step. The invention is industrially applicable.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NO2004/000255

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
US2004/0010947 A1, E	22/01/2004	19/07/2002	

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NO2004/000255

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Cover sheet

INTERNATIONAL PATENT CLASSIFICATION (IPC)

E02F 3/88 (2006.01)

E02F 3/90 (2006.01)

2 6 -07- 2005

Claims

1. Subsea excavation and suction device for complete submersion comprising a suction head (1) that is movably attached to a hydraulic controller arm (13) and has an inlet opening (3) at a free, outer end and an outlet opening (12) attached to a suction hose (10) arranged at a distance from the inlet opening (3), said suction head (1) having means for disintegration solid material and having a larger cross-sectional area at the inlet opening (3) than at the outlet opening (12), **characterized in** that the suction head (1) comprises both hydraulic and mechanic means to disintegrate solid material, where the hydraulic means comprises a number of primary jet nozzles arranged along the edge (6) surrounding the inlet opening (3) and having fluid communication with a source of pressurized liquid while the mechanic means comprises at least one bar (4, 5) dividing the inlet opening (3) into inlet sections (3i), said at least one bar being shaped and dimensioned to effect a mechanic disintegration of solid material (sediment).
2. Device as claimed in claim 1, **characterized in** that at least one of the edges (6₁-6₄) is shaped and dimensioned to act to mechanically disintegrate solid material.
3. Device as claimed in claim 2, **characterized in** that all edges (6₁-6₄) are shaped and dimensioned to act to mechanically disintegrate solid material.
4. Device as claimed in anyone of claims 1-3, **characterized in** that a number of the primary jet nozzles (7) are arranged to purge in a direction substantially straight ahead from the inlet opening (3), i.e. in a direction mainly opposite to the direction of movement of material (sediment) being sucked into the inlet opening (3).
5. Device as claimed in anyone of claims 1-4, **characterized in** that a number of the primary jet nozzles (7) are arranged parallel with each other and arranged so close to one another that a substantially smooth cutting edge in the sediment is obtained during use.
6. Device as claimed in anyone of claims 1-5, **characterized in** that a number of secondary jet nozzles (15) are arranged within the suction head (1) to further disintegration of sediment, said secondary jet nozzles (15) having fluid connection with a pressurized liquid and being arranged mainly perpendicular to the direction of movement for the sediment being sucked into the inlet opening (3).
7. Device as claimed in anyone of claims 1-6, **characterized in** that at least some of the primary (7) and/ or secondary jet nozzles (15) are comprised by holes bored along a line in parts of the supply pipe (18) for liquid from the mentioned pressurized liquid source.

8. Device as claimed in anyone of claims 1-7, **characterized in** that at least some of the primary nozzles (7) are arranged in wedge-like teeth (16) that extend from around the inlet opening (3) of the suction head.
9. Device as claimed in anyone of claims 1-7, **characterized in** that at least some of the primary nozzles (7) are arranged in a wedge-like edge that extends from around the inlet opening of the suction head.
10. Device as claimed in anyone of the preceding claims, **characterized in** that at least some of the bars (4, 5) are provided with primary jet nozzles (7).
11. Device as claimed in anyone of the preceding claims, **characterized in** that the cross-sectional area of said inlet sections (3i) are substantially equal and not larger than the cross-sectional area of the outlet opening (12).
12. Device as claimed in anyone of the preceding claims, **characterized in** that said bars (4 or 5) divide the inlet opening (3) of the suction head(1) into sections in a grid pattern in one direction.
13. Device as claimed in anyone of the preceding claims, **characterized in** that said bars (4 or 5) divide the inlet opening (3) of the suction head(1) into sections in a grid pattern in two directions.
14. Device as claimed in anyone of the preceding claims, **characterized in** that secondary nozzles (15) for proving jet streams mainly across the direction of movement of solid material being sucked into suction head (1) are arranged near outlet opening (12) in suction head (1).
15. Device as claimed in anyone of the preceding claims, **characterized in** that a backflush nozzle is arranged near the outlet opening (12) in order to be able to temporarily reverse the direction of transportation through suction hose (10).
16. Device as claimed in anyone of the preceding claims, **characterized in** that the suction hose (10) is provided with a sideways opening or valve that opens at a predetermined underpressure, so that the suction force and thereby the risk of clogging is reduced.
17. Device as claimed in anyone of the preceding claims, **characterized in** that the inlet opening (3) of the suction had (1) has a cross-sectional area that is chosen so that the average water velocity through inlet opening (3) is at least 30% of the water velocity through outlet opening (12).
18. Device as claimed in anyone of claims 1-17, **characterized in** that the inlet opening (3) of the suction had (1) has a cross-sectional area that is chosen so that the average water velocity through inlet opening (3) is at least 50% of the water velocity through outlet opening (12).
19. Device as claimed in anyone of the preceding claims, **characterized in** that the hydraulic controller arm (13) has an outer telescopic arm for linear conveying of the suction head.

20. Device as claimed in anyone of the preceding claims, **characterized in** that the hydraulic controller arm (13) has a movability that allows the suction head (1) to be moved sideways or rotated.
21. Device as claimed in anyone of the preceding claims, **characterized in** that the suction force in the suction head (10) is provided by means of an ejector with one or more ejector nozzles arranged angularly (aslant) outside the cross-section of the suction hose (10).
22. Device as claimed in anyone of the preceding claims, **characterized in** that the device is mounted on or comprises a full track chassis (22).
23. Device as claimed in claim 22, **characterized in** that the chassis (22) comprises a platform (23) which is pivotal about a gear rim or the like.